# Matlab Toolbox for Automatic Clean-up of Coastal and Estuarine Tidal Datasets

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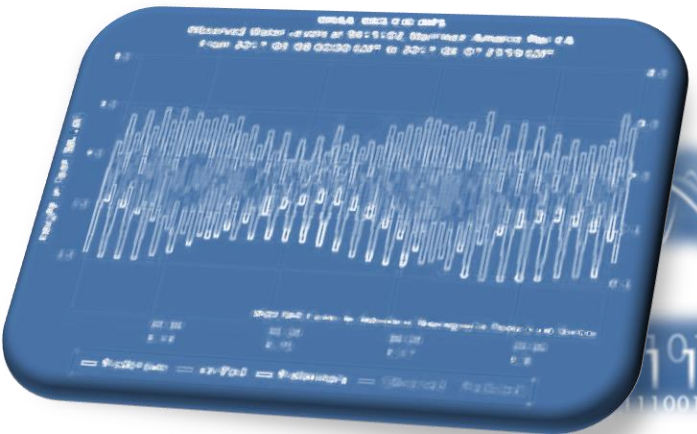
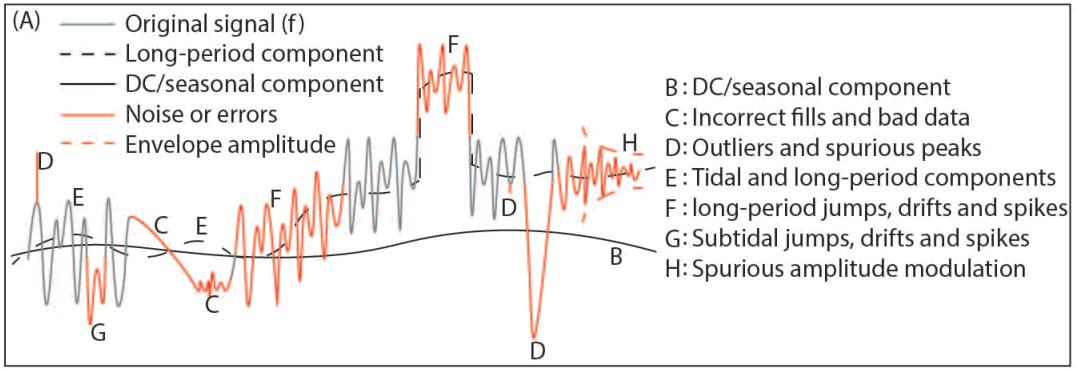


# Need for data cleanup

- Tide data is corrupted by various sources of error:
  - erroneous outliers,
  - junk data and blocky interpolations,
  - sudden shifts due to jolts,
  - drifts due to instrument biases,
  - spurious amplitude modulations due to scale errors,
  - high-frequency noise,
  - poor timekeeping, and
  - biases and modulations conflated with unsteadiness in the freshwater flow in estuaries.

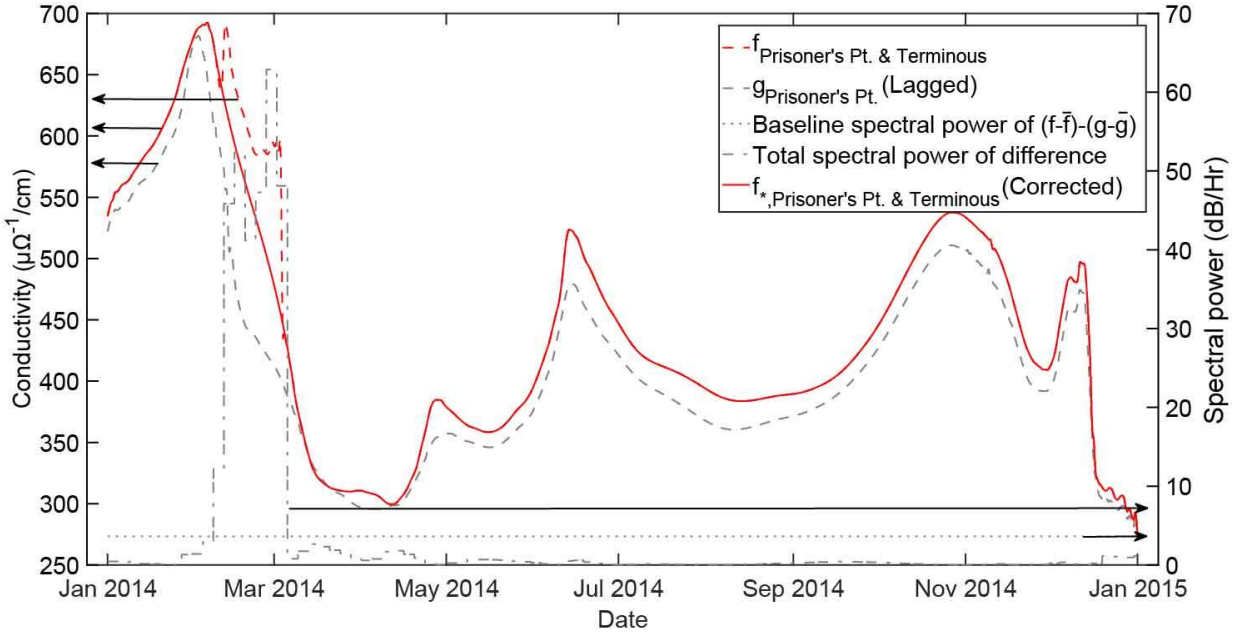
- Corrupted data has to be subjected to extensive Quality Control:
  - can delay data delivery from days to years, and
  - urgent need for a rapid QC framework as data demand increases with state-of-the-art analysis techniques.

# KATANA: Kinematic Auto-Tidal Abatement of Noise Application



# Pre-processing for an estuarine signal

- Consider two signals spatially close by,
- Assume errors are *iid*,
- Get the periodogram of their difference,
- Remove parts with large spectral energy, and
- Reconstruct with a spline



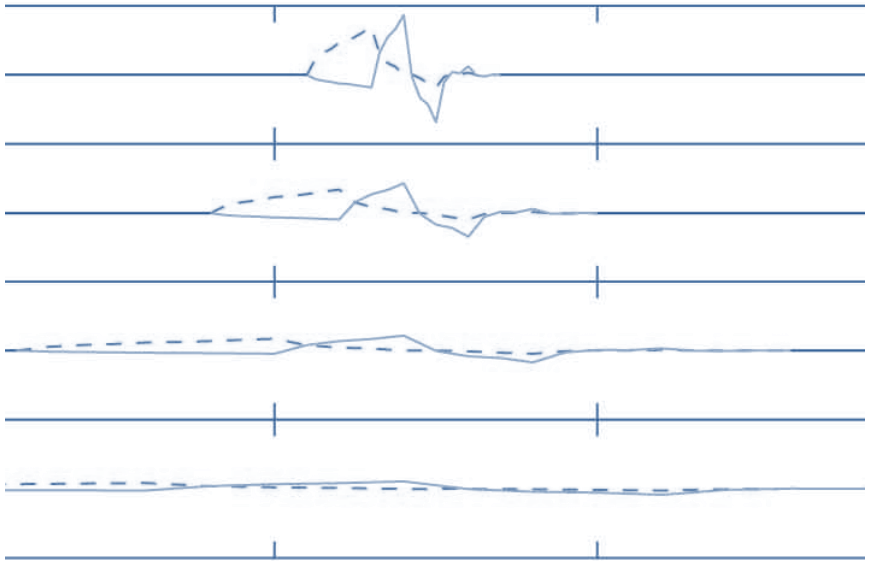
# Results

- Martinez: jumps, blocky interpolations, outliers
- Vizag: outliers
- Bournemouth: drift, damping
- Garwood Bridge: nothing wrong – sanity check
- Prisoner’s Point: real and spurious jumps, outlier

# Conclusions and future directions

- Automatic tool is fast and relatively error free.
- Utilizes multiple advanced signal processing techniques… requires parameter tuning.
- Uses proprietary tools and techniques:
  - DSP toolbox (Mathworks Inc. 2016),
  - WMTSA toolbox (Cornish et al. 2006),
  - Wavelet despiking (Patel et al. 2014)
- Needs extensive testing.
- Hilbert transforms may offier a more elegant one-stop shop approach.
- Need to work on a parameter tuning procedure.
- Will be available online and open source soon at a NOAA portal.

# Thanks to…



- Andrew Hein, NMFS
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- Derek Fong, Stanford University
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